SCIENTIFIC ARTICLE

Pattern of occlusive disease in lower extremity arteries in patients qualifying for revascularization in a North Central Province tertiary care centre in Sri Lanka

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Keywords: Pattern of occlusive arterial disease; arterial segments; risk factors; clinical presentation

Abstract

Introduction

In Sri Lanka many patients with occlusive arterial disease [OAD] undergo revascularization. The patterns of OAD varywith the underlying risk factors, however there is a paucity of data regarding this in Sri Lankan patients. Only one study reported the pattern of OAD among patients undergoing angioplasty in Sri Lanka. This study used conventional or catheter angiograms. There were no studies describing the patterns of OAD based on computerized tomographic angiography [CTA] imaging was reported in Sri Lanka earlier. This study describes the CTA based pattern of OAD among patients admitted for intervention at the Teaching Hospital Anuradhapura [THA].

Methods

This study was done at the vascular and transplant unit of THA. Patients with critical limb ischemia [ulcer, gangrene, rest pain] and disabling claudication were included. Data on patient demography, comorbid diseases, and the pattern of arterial occlusion were analysed.

Results

100 patients with 81 [81%] males were included. The mean age was 67.6 years [53-83].60 had ulcers, 25 gangrene, 10 rest pain and 5 had disabling claudication. 63 [63%] were smokers. diabetes mellitus, hypertension, ischemic heart disease, heart failure and chronic kidney disease were present in 65 [65%], 47, 25, 11 and 13 respectively.

Distal vascular disease [anterior tibial- AT - 55 and posterior tibial - PT - 44] was present in 65 [65%]. Iliac, Femoral [common femoral – CFA and superficial femoral - SFA] disease were present in 15 [15%] and 57 [57%] respectively. 28 [28%] had isolated distal arterial disease. The distal disease was not significantly associated with diabetes mellitus [p - 0.39].

Conclusion

Distal occlusive arterial disease is the commonest followed by femoral disease. This study does not show an association between diabetes mellitus and distal disease, contrary to the popular belief. Further countrywide studies with larger study populations are needed to come to a final conclusion.

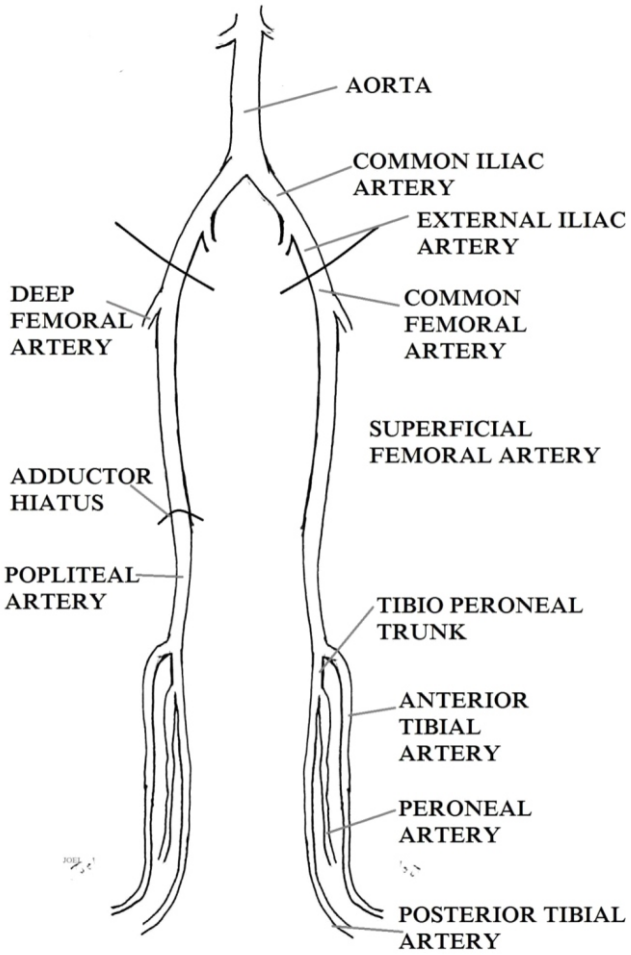

Figure 1. Arteries of the lower limb

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https://orcid.org/0000-0002-4371-4527
Received: 11-01-2021 Accepted: 28-07-2022
DOI: http://doi.org/10.4038/sljs.v40i2.8794

Introduction

The prevalence of occlusive arterial disease [OAD] increases with age. In a study done among 2174 individuals in United States the overall prevalence of OAD among those older than 40 years was 4.3% and it increased to 14.5% in individuals older than 70 years [1]. In a study done at the Gampaha district of Sri Lanka among individuals aged 40 to 70 years, the prevalence of OAD was 3.6 % [2].The Sri Lankan population is rapidly aging and the number of patients undergoing interventions for OAD is increasing in Sri Lanka.

Arteries involved with OAD vary depending on the risk factors [3]. In a study done among 2659 patients undergoing angioplasty, the incidence of iliac artery disease was common among younger patients with hypertension and smoking. Whereas infragenicular OAD was common among older male patients with diabetes mellitus [4]. In Sri Lanka one study reported the pattern of OAD among patients undergoing angioplasty. In this study the description of the pattern of OAD was based on conventional or catheter angiography [5]. However there were no studies describing the patterns of OAD based on computerized tomographic angiography [CTA] based imaging was reported in Sri Lanka earlier. The study was done among 367 patients undergoing bypass surgery for lower limb OAD, 55% had infra popliteal disease. This indicates that the distal OAD is more prevalent [6].

This study describes the pattern of OAD among patients who needed vascular interventions at the Teaching Hospital Anuradhapura [ANP] in the NCP in Sri Lanka.

Method

This is a prospective study of patients admitted for vascular interventions to the ANP Sri Lanka. The study was done from October 2017 to October 2019. All patients who were planned for intervention were in Fontaine stages IIB - IV [IIB Disabling claudication, III - rest pain, IV - ulcers or gangrene]. Data on patient demography, clinical presentation, comorbidities, and sites of arterial occlusions were collected. All patients underwent computed tomographic angiography [CTA] assessment to assess the sites of arterial occlusion before intervention. All CTA were interpreted by the vascular surgeon together with the radiologist. To overcome the difficulties in interpretation caused by arterial wall calcification, the image contrast level and the window level were adjusted and the images were reviewed both in cross-sectional and longitudinal views. Unclear images due to non-enhancement by contrast [due to poor timing], images with inadequate extent of exposure and images of patients who have undergone previous arterial interventions were excluded. The sites of arterial occlusions were classified into segments for further description i.e. Iliac [CIA and EIA], femoral [CFA and SFA], popliteal [PA] and distal [AT, PT and PA].

Results

120 CTA images were analysed. 100 patients were included. 20 were excluded [Unclear images due to non-enhancement by contrast [due to poor timing], images with inadequate extent of exposure and images of patients who have undergone previous arterial interventions]. 81 [81%] were males and 19 were females. Mean age was 67.6 years [53-83]. 60 [60%] had ulcers, 25 [25%] gangrene, 10 [10%] rest pain and 5[5%] had disabling claudication. 63 [63%] were smokers. Diabetes mellitus [DM], hypertension [HT], ischemic heart disease, heart failure and chronic kidney disease were present in 65 [65%], 47 [47%], 25 [25%], 11[11%] and 13 [13%] respectively [Table 1].

Distal vascular disease [Anterior Tibial- AT - 55 and Posterior Tibial - PT - 44] was present in 65 [65%]. Femoral, Iliac diseases were present in 57 [57%] and 15 [15%] respectively [Table 2]. 14 of 15 [93.3%] patients with iliac artery disease were smokers. Among rest of the patients 63/100 [63%] were smokers. This association of smoking and iliac artery disease was statistically significant [p-0.02] [Table 3]. All the patients who had iliac arterial disease were males. The association of hypertension and diabetes mellitus with iliac artery disease was not significant. 28 [28%] had isolated distal arterial disease. The association between diabetes mellitus and isolated distal disease or anterior tibial disease was not statistically significant [p - 0.39]. And the association of hypertension, and smoking with femoral and distal occlusive arterial diseases were not found to be statistically significant in this study [Table 3]. There was no statistically significant correlation found between the site of OAD and the presentation. This is probably due to the low numbers.

Table 1. Associated Risk factors

Co morbidities / Risk factors	Number [%]
Diabetes Mellitus	65 [65%]
Hypertension	47 [47%]
Smoking	63[63%]
Ischaemic Heart Disease	25 [25%]
Heart Failure	11 [11%]
Chronic Kidney Disease	13 [13%]

Table 2. Arterial segment involved

Arterial segment involved		Number [%]
Iliac		15
Femoral		57
Popliteal		21
Distal	AT	55
	PT	44
	Combined AT/ PT and PA	65

Table 3. Significance of associated risk factors with arterial segments involved

Arterial Segment	Risk Factors	P Value
Iliac	Diabetes Mellitus	P - > 0.05
	Hypertension	P - > 0.05
	Smoking	P - 0.02
	Age	P - > 0.05
	Gender	P - > 0.05
Femoral	Diabetes Mellitus	P - > 0.05
	Hypertension	P - > 0.05
	Smoking	P - > 0.05
	Gender	P - > 0.05
Anterior Tibial	Diabetes Mellitus	P - > 0.05
	Hypertension	P - > 0.05
	Smoking	P - > 0.05

Discussion

The pattern of arterial segments involved with OAD varies with the risk factors. This study shows that the distal disease is the commonest [65%] followed by femoral disease [57%] among patients admitted for interventions at ANP. Whereas in other studies the commonest diseased segment was femoro-popliteal [51.2%] followed by the distal disease [21.1%] [4].

Previous studies have shown that younger age is associated with proximal [iliac] disease whereas old age is associated with tibial arterial disease [4] [7] [8]. All the patients who had iliac disease in this study were younger males. However this association of iliac disease with younger age was not statistically significant [Table 3]. Both active and passive smoking increases the risk of occlusive arterial disease [9]. This study also shows a statistically significant association of smoking with iliac arterial disease.

Diabetes mellitus is a well-known risk factor for occlusive arterial disease [10] [11]. The prevalence of diabetes mellitus varies depending on the population. In one study done in Sri Lanka among rural population in 2005 the prevalence of diabetes mellitus was 14.2 % among males and 13.5 % among females [12]. However prevalence of diabetes mellitus among patients undergoing interventions for occlusive arterial disease is higher. In this study 65% of the patients with occlusive arterial disease undergoing interventions had diabetes mellitus. In another study done at the University of Colombo among patients undergoing interventions for critical limb ischemia the prevalence of diabetes mellitus was 80% [6]. Previous studies have reported an association between diabetes mellitus and distal vascular disease [7] [13] [14]. However this study does not show an association between diabetes mellitus and the distal disease [p - 0.39] probably due to the small number of subjects in this study.

Further countrywide studies with a larger study population are needed to come to a final conclusion about the true nature of the pattern of occlusive arterial disease in Sri Lanka. In addition these differences in the incidence and the site of occlusion need to be considered when allocating resources for the revascularisation procedures.

In addition hyperlipidaemia is a well-known risk factor for occlusive arterial disease. Especially fasting cholesterol level of greater than 270 mg/dl is associated with a two fold increase in the incidence of occlusive arterial disease [15]. Hyperlipidaemia is associated with more proximal [iliac] disease [4]. However in this study data on hyperlipidaemia was not included. This is a limitation of this study.

Conclusions

This study reports the pattern of OAD based on CTA images. Previous studies have not reported the pattern of OAD based on CTA in Sri Lanka. This study shows that distal disease is the commonest [65%] followed by femoral disease [57%]. This study does not show an association between diabetes mellitus and the distal disease, contrary to the popular belief. However the number included in this study is not adequate to come to a final conclusion. Further countrywide studies are needed in the future. In addition the pattern of OAD should be considered when allocating resources for vascular interventions.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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